THE STRELTSOVSKOYE URANIUM DISTRICT

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Abstract

This paper describes the geology of the Streltsovskoye uranium district located in south-eastern Zabaikalie region, Chita Province, Siberia, Russia. This district hosts Russia's only currently active uranium production centre. The uranium ore was discovered from 1963 to 1967 by drilling below fluorite veins which had minor associated uranium mineralization and radioactive anomalies. The uranium occurs as large scale vein stockwork deposits of hydrothermal origin within a volcano-tectonic caldera formed by continental volcanism of Late Mesozoic age. Rocks occurring in the caldera include basalt and trachydacite, overlain by rhyolite, and with associated interbedded sediments. The ore bodies occur in steeply dipping faults, with the greatest concentrations located where faults along the margins of the caldera intersect steeply dipping, cross cutting, northeasterly and northwesterly striking faults. The Streltsovskoye caldera extends over an area of 150 km^2 and is underlain by a large batholith. The 19 identified uranium deposits occur in structural features that cut through the caldera sequence and extend into the basement rocks. The caldera has a maximum thickness of 1400 metres. Details of several deposits are given, including descriptions of mineralization and associated alteration.

The Streltsovskoye uranium district is located in south-eastern Zabaikalie in the economically developed region of the southern Chita Province of the Russian Federation. Due to geographical conditions, the region is easily accessible. However it took about 15 years to discover the uranium deposits. During this discovery period, the opinions on the uranium potential of the territory changed several times. The evaluation of the uranium potential of the Streltsovskoye fluorite deposit, where local radioactive anomalies and minor uranium mineralization were already known at a depth of 50 m, was undertaken in 1963.

The first hole drilled below the thinning out of the fluorite vein intersected a thick ore body at a depth of 220 m. It was located in trachydacites in the lower wall of the fault bounding the fluorite vein. This was the first discovery of one of the largest deposits in the Streltsovskaya caldera. By 1967, the Streltsovskoye ore field was defined as a large industrially important uranium ore region with unique reserves and ore grade. The bases of these deposits construction of the Priargunsky Mining and Chemical Processing Works was started in 1968.

The deposits of the Streltsovskoye uranium district are very typical representatives of large-scale hydrothermal uranium deposits, formed in areas of continental volcanism during the final stages of Late Mesozoic tectono-magmatic activity. The deposits are located within the Streltsovskaya volcano-tectonic caldera which covers 150 km^2 (Fig. 1).

The position of the caldera is defined by the junctione of long-lived deep faults of various orientations at the arch of a local gneiss-granite dome. Granitoid rocks, originated from silicapotassic metasomatism and anatexis, which developed throughout Proterozoic to Early Mesozoic time, are widely distributed in the basement and flanks of the volcano-tectonic depression. Various Precambrian metamorphic rocks (quartz-plagioclase-biotite gneisses, biotite-hornblende gneisses, dolomitized limestones, etc.) occur as xenolithes among granitoids of various ages.

The sedimentary-and-volcanogenic rocks forming the caldera have an average thickness of 500–800 m, and are as much as 1400 m thick in the deepiest parts of the caldera. The geological section is represented by the Upper Jurassic Priargunskaya series. The series consists of three basalt sheets alternating with three trachydacite sheets, separated by thin horizons of sedimentary and tuffaceous rocks. The upper part of the section is composed of the Lower Cretaceous Turginskaya

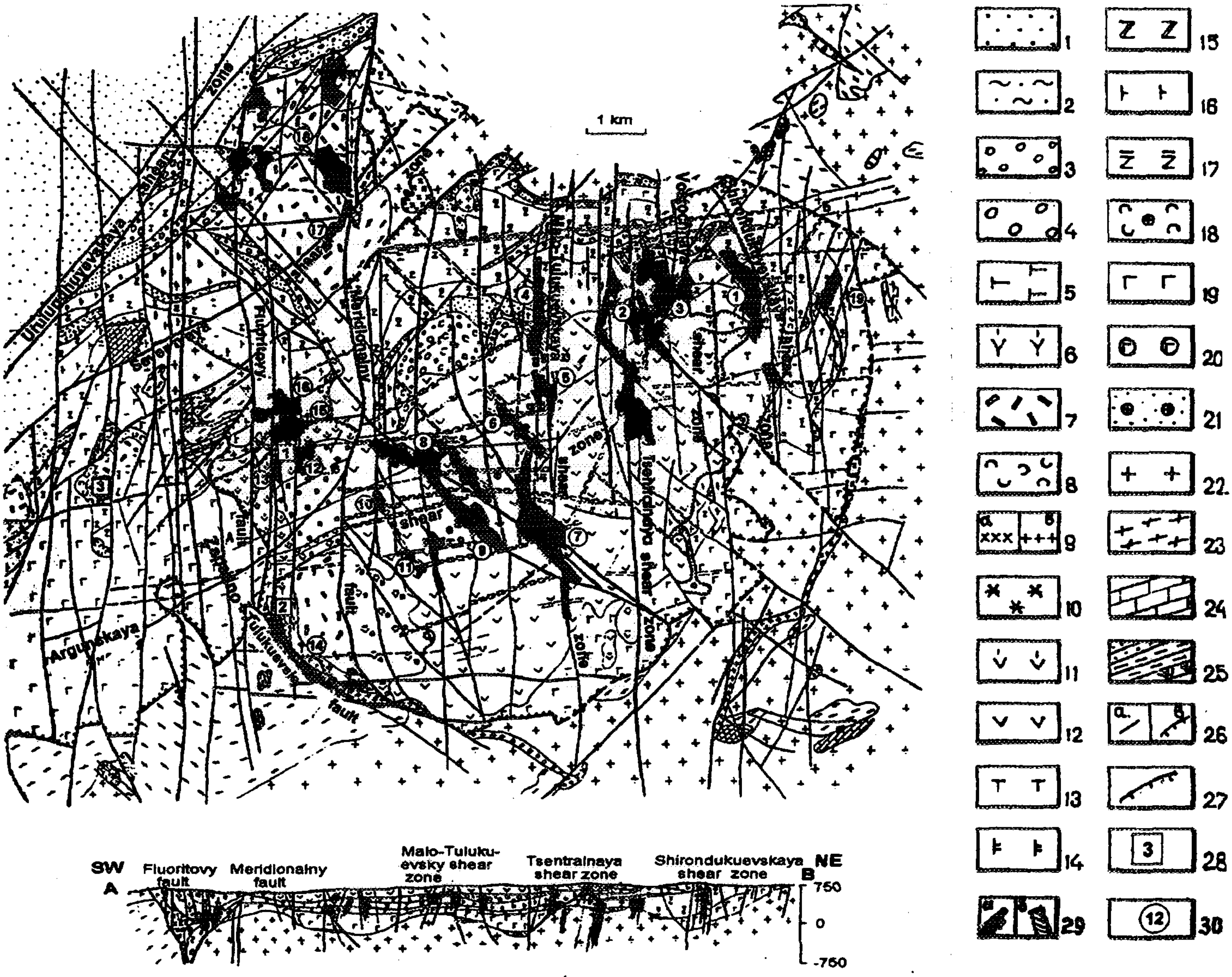

Fig. 1. The Streltsovskoye ore field. Geological map.

Sedimentary-volcanogeneous rocks (upper structural level):
1-13 - the Turginskaya series (Lower Cretaceous): 1 - sandstones, 2 - aleurolites, 3 - gritstones, 4 - conglomerates, 5 - basalts, 6 - liparites of neck facies, 7 - liparites of sheet facies, 8 - acid tuffs, 9 - granosyenite-porhyries (a), liparites (b) - extrusive bodies of subvolcanic facies; 10 - spherolitic liparites, 11 - felsites of neck facies, 12 - felsites of sheet facies, 13 - plagioclasic trachydacites; 14-21 - the Pruargunskaya series (Upper Jurassic); 14 - basalts of upper sheet, 15 - trachydacites of upper sheet, 16 - basalts of middle sheet, 17 - trachydacites of lower sheet, 18 - "ocellar" trachydacite tuffs, 19 - basalts of lower sheet, 20 - conglomeratic breccias of basalts, 21 - basal conglomerates.

Lower structural level:
22 - granites of the Variscian epoch of granitization, 23 - granites of the Caledonian epoch of granitization; 24-25 - metamorphic rocks; 24 - dolomitized limestones, 25 - biotite-amphibole gneisses, amphibolites, metasedimentary rocks; 26 - tectonic faults: a - steeply dipping, b - gentle; 27 - the boarder of the Streltsovskaya volcanotectonic caldera, 28 - volcanic apparatuses: 1 - Krasnokamensky, 2 - Yugo-Zapadny, 3- Zapadno-Tulukuyevsky; 29 - molibdenum-uranium ore bodies: a - run-of-mine ahd high-grade ores, b - lean ores (at the geological map - ore body projections on the surface); 30 - uranium deposits:
1 - Shirondukuyevskoe, 2 - Streltsovskoye, 3 - Antei, 4 - Oktyabrskoe, 5 - Luchistoye, 6 - Martovskoye, 7 - Malo-Tulukuyevskoye, 8 - Tulukuyevskoye, 9 - Yubileinoye, 10 - Vesennee, 11 - Novogodneye, 12 - Pyatiletneye, 13 - Krasny Kamen, 14 - Yugo-Zapadnoye, 15 - Zherlovoye, 16 - Argunskoye, 17 - Bezrecnoye, 18 - Dalnee, 19 - Vostochno-Shirondukuyevskoye.

series where rhyolite sheets, which are divided into felsites and liparites using texture and structure features, predominate. The section is completed by liparites alternating with basalt sheets and conglomerate and sandstones horizons. Sub-volcanic feauters occur along the center shear zone at junctions with faults of the Argunskaya shear zone. The roots of the volcanoes are necks of liparites and syenite-porphyries extended along the faults. In the upper zone the cone-shaped pipes consist of eruptive breccias of rhyolites. The eastern part of the caldera is exceptional and is composed of stratified gently pitching effusive sheets and sedimentary rocks. As the result of the processe of caldera formation, the rocks of the basement and cover were broken into blocks which underwent movement in opposite directions.

The Argunskaya shear zone of the north-eastern and sub-latitudinal trend is the major ore-controlling zone in the Streltsovskaya caldera. It was initiated at the stage of plicated dislocations. It remained tectonically mobile throughout the Proterozoic-Paleozoic history and the complete period of sedimentary-volcanogenic cover formation. It consists of numerous tectonic fractures with a northeastern (70°) and latitudinal strike accompanied with zones of close spaced jointing of the rocks. The total thickness of tectonically broken rocks is 3–5 km. Within the Argunskaya shear zone, quartz-K-feldspar-albitite metasomatites and greisens occur together with pre-ore and ore-accompanying low-temperature hydrothermal alterations (argillization, albitization). Alternation occurs both in basement and in sedimentary-volcanogenic deposits of the caldera.

The meridional shear zone also consists of a series of tectonic joints that are second order to the major meridional fault. The junction of the meridional and Argunskaya deep shear zones was the main magma- and fluid-transporting channel in the post-granitization period and during volcanism, as well as the ore-transporting channel during the final period of activization.

Meridional faults, grouped into zones of 500–900 m thickness, were important ore-controlling structures in the caldera. The majority of the deposits are located within the Argunskaya shear zone at its junctions with the meridional shear zones. Both faults and zones of steeply dipping jointing with a northwestern (330°) strike, accompany the faults. They formed at junctions of the meridional and northeastern fractures and host uranium mineralization in the sedimentary-volcanogenic strata. As this took place, zones of contiguous jointing were developed between the meridional faults. They are for the most part second order joints. Zones of steeply dipping jointing were formed mainly in the effusive sheets and less brittle commonly in sedimentary rocks. The presence of brittle rocks at several levels in the section resulted in the appearance of mineralized fissure zones on several lithological levels.

Faults with either a northeasterly (30) or northwesterly (0) strike host uranium ore in the basement rocks. Channels for percolating hydrothermal solutions were provided by steeply dipping faults which restrict the caldera, and cross cutting faults that extend through basement rocks and all sedimentary-volcanogenic strata.

In addition to the steeply dipping tectonic fractures there are several structural features present with a shallow dip. These include gently pitching fractures formed at the contact between the basement rocks and overlapping sedimentary-volcanogenic strata, as well as at the border of the Priargunskaya and Turginskaya series. These occur mainly in the horizon of tuffs and sedimentary rocks, at the base of the felsite sheet.

Gently drapping fractures consist of numerous cracks filled with clay alterations. These clay bearing zones are the screening surfaces during of percolation the ore solutions. In some cases they host ore bodies. A combination of ore-treating, ore-controlling and ore-hosting structural elements in unified space with a few numbers of drainage faults and numerous screening fractures appeared to be the major factor which caused favourable thermobaric conditions in the area of ore deposition.

The Streltsovskoye ore district includes 19 uranium deposits. The two largest are located in the basement rocks (Argunskoye, Antei). Seventeen occur in sedimentary-volcanogenic rocks of the caldera fill of thirteen occur in *stratified effusive* sheets and in sedimentary rocks, while four are in effusive rocks of the vulcanic neck facies. Some of the deposits in the sheet facies volcanic rock also belong to the large class of deposit, including the Streltsovskoye, Tulukuyevskoye and Octyabrskoye. These three deposits together with the two deposits (Argunskoye, Antei) in the basement are the only ones on the reserves and ore grade.

Geological structure is the major factor controlling uranium deposit development. The chemical composition of the rocks does not have an influence on ore development richness; all rocks of very different composition — granites, acid, intermediate and basic effusives, sedimentary types, and dolomitized limestones — host ore.

The bedded structure of the sedimentary-volcanogenic series and the repetition in the geological section of the rock types, favourable for fissure zone formation, caused multi-layer distribution of the ore. It occurs at 6 lithological-structured levels: levels 1 in 5 in the sedimentary-volcanogenic sequence with the 6th level represented by the basement rocks. Three major morphological body types are recognized: stockwork, veine and bedded. Every deposit is represented by these three (or rarely two) are recognized: types of ore bodies located as a rule at several lithological-structural levels.

The third and the fourth levels, where uranium mineralization is concentrated in the trachydacite sheets as stockwork-like or rarely vein-like bodies, contain the richest ore. The Antei deposit, mineralization is located in the basement rocks in a large vein-like body which also includes thicker stockwork-like zones. In the Argunskoye deposit — a thick stockwork occurs with vein-like apophyses. Ore bodies along bedding occur at the second lithological-structural level where they are located in a gently dipping fracture at the base of felsite sheet. Smaller bed-like bodies occur in the sandstones of the basal horizon of the sedimentary-volcanogenic strata.

Uranium mineralization occurs in various altered rocks. Haloes of pre-ore metasomatic alterations (hydromica-carbonate-quartz, sericite-carbonate-quartz, kaolini-carbonate-quartz) were formed as a result of the processes of acidic leaching. Alteration, which developed in close association with uranium deposition, is also developed. They are manifested in the metasomatic-streaky formation of albite and hematite, as well as silicification and carbonization.

The uranium mineralization is represented by pitchblende, with rare coffinite and, as very small amounts of brannerite at some deposits. The ores are characterized by impregnations, vuggy impregnations, streaky and brecciated structures. The uranium content varies over a wide range — from the cut-off[1] to the a few percent. Average content in some bodies and deposits ranges from 0.15–0.33 % and in the largest bodies up to 0.6–3.0%.

In addition to uranium the ores have a complex composition. They contain molybdenum, and rarely fluorite in commercial quantities. The deposits belong to the hydrothermal low-temperature type of molybdenum-uranium formation. They were formed in several phases of a single hydrothermal event. The process of ore formation took place in 6 phases:

1 Phase of argillization (facies of kaolinite and hydromica alteration);
2 Cryptoquartz-carbonate-sulphide phase;
3 Albite-brannerite (the first ore) phase;
4 Quartz-molybdenite-coffinite-pitchblende (the major ore) phas);
5 Quartz-molybdenum-sulphide phase;
6 Calcite-fluorite-dickite (post-ore) phase.

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[1] Editor's note: The normal cut-off grade used for conventional reserve estimation (i.e. non-in situ leach) in the Commonwealth of Independent States B 0.0390 U.

The ore and ore associated minerals were deposited from hydrothermal solutions in tectonic fractures, in rock pores and by metasomatic replacement. Vuggy-disseminated, streaky-disseminated, and brecciated ore structures are the most common. The age of the uranium ore is determined as Early Cretaceous. It is mainly 130–125 million years, with youngest age of 110 million years.

All deposits of the Streltsovskoye ore field are hidden, and not exposed at present on the day surface. Most of the ore bodies occur at a depth of more than 200 m. The majority of them are also located in the interval of 400–900 m below the surface. Only a single body occurs at a depth of 50–100 m.

The Streltsovskoye deposit is the largest of the deposits. It occurs in the sedimentary-volcanogenic cover, in the eastern part of the caldera. It is comprised of 6 structurally interrelated ore bodies, each of which is classified as an average or large sized deposit.

A significant part of the reserves is contained in the Streltsovskaya vein. It has a length of 750 m and an average thickness of 6 m. The average uranium content is 0.33% . All rocks cut by the fault host ore mineralization. However, the highest contents of uranium (up to 0.8%) and molybdenum (up to 0.4%) are in the basalts (Fig. 2). The main part of the uranium reserves at the deposits are concentrated in stockwork-like bodies in the lower trachydacite sheet. The bodies consist of contiguous steeply dipping ore-bearing fractures feathered large faults (Fig. 3). The uranium content in ore bodies increases near the lower or upper limiting surfaces such as gently dipping fractures in tuffs or conglomerates (Fig. 4, 5); the stockworks split into short vein-like bodies when they thin out. The length and width of the ore bodies reaches a few hundreds of metres.The uranium content varies between 0.15 and 0.5%.

Hydrothermal wall-rock alterations in the Streltsovskoye deposit is manifested by hydromicatization, albitization-2, carbonatization, streaky and metasomatic silicification and pyritization, and the development of ankerite and chamosite veinlets. Veins of fluorite and veinlets of dickite and calcite formed in the post-ore stage. Pitchblende, and rarely coffinite, represent uranium mineralization. Mineralization forms finely disseminated, vuggy-disseminated aggregates, streaky segregations along cracks, saturates tectonic breccias and borders their fragments. Molybdenum mineralization is represented by jordisite which is transformed to ilsemanite during oxidation. The association of uranium, with pyrite; isolated quartz veinlets and coarse-flanked molybdenite are rarely noted. Berylium (bertrandite) is also present in noticeable quantities in some uranium and molybdenum ore bodies.

Many of the other deposits formed in the sedimentary-volcanogenic strata are characterized by similar geological structures. The Tulukuyevskoe uranium-molybdenum deposit, is one of these and it is of major importance.

This deposit is located in the central part of the Streltsovskaya caldera. It occurs within the northwestern strike shear zone of the same name where it cross the Argunskaya shear zone in a terrain of stratified Upper Jurassic volcanites. It consists of a series of contiguous, steeply dipping fractured-veined, stockwork-like and gently pitching ore bodies of complex morphology. They are located at the second lithological-structural level and do not outcrop (Figs 6 and 7). Molybdenum occurs in commercial concentrations in the ore. Insignificant concentrations of lead, beryllium and rhenum occur with the uranium. The length of the deposit is 1300 m. The richest part is 400 m long and the width of the productive zone is from 150 to 250 m. The section containing ore is 180–270 m high.

The fifth ore-bearing zone, controlled by tectonic fractures with a northwestern strike, is the richest and contains 60–70% of the total reserves. The ore bearing rocks are felsites, lava breccias of felsite composition and tuffaceous-sedimentary rocks: a minor part of the lower grade ore occurs in underlying basalts and trachydacites. The uranium ore grade is high. The average uranium content exceeds 0.4%, and ranges from the cut-off to 5–7% in some intervals; the highest uranium contents

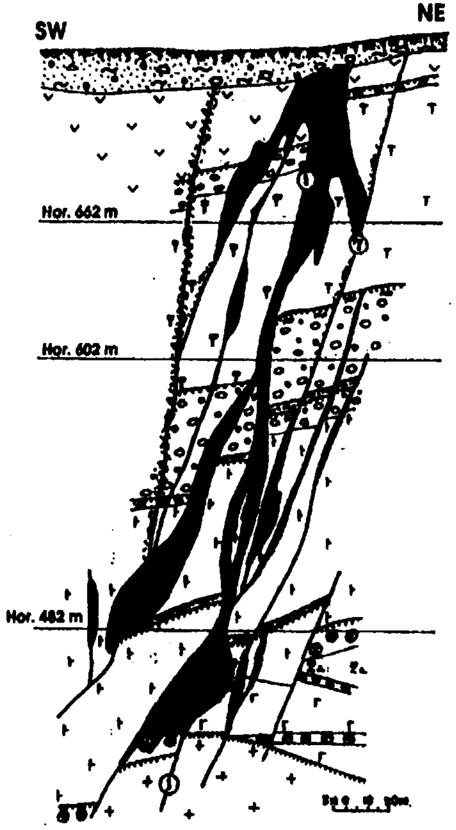

Fig. 2. The Tsentralny area of the Streltsovskoye deposit. Geological section on the 115+50 prospecting line. Legend see on Fig.1.

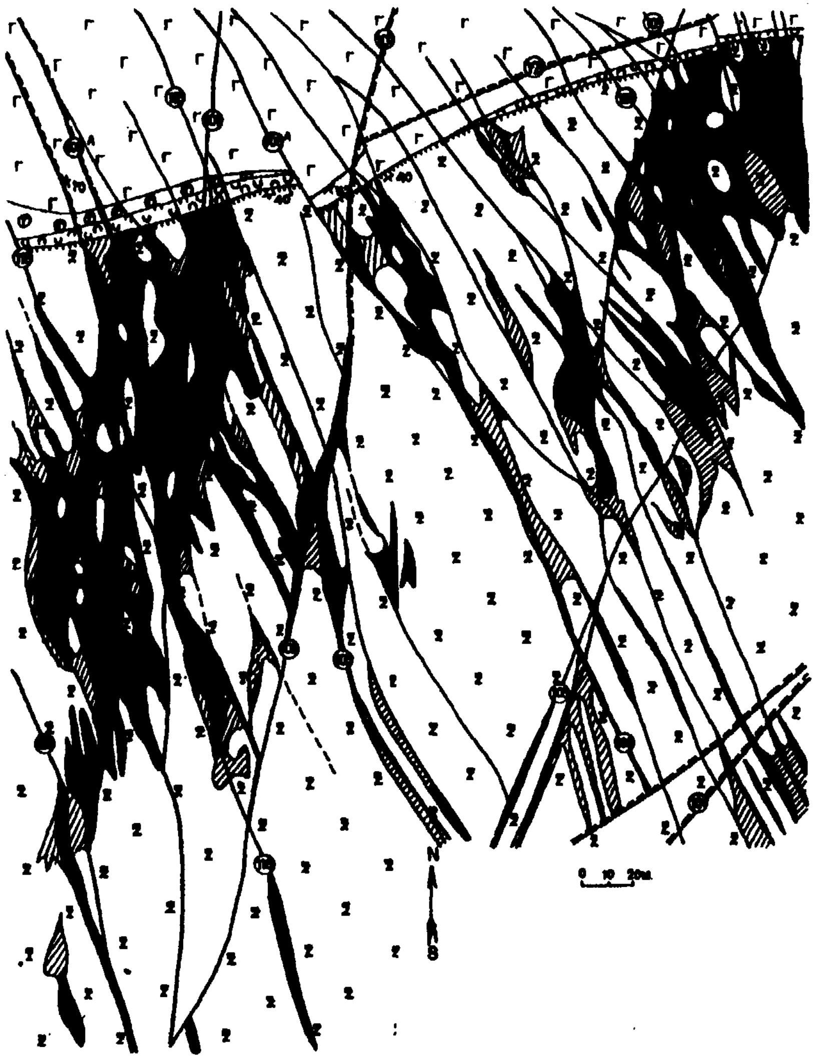

Fig. 3. The Glubinny area of the Streltsovskoye deposit. Geological plan of the horizon of 332 m. Legend see on Fig. 1.

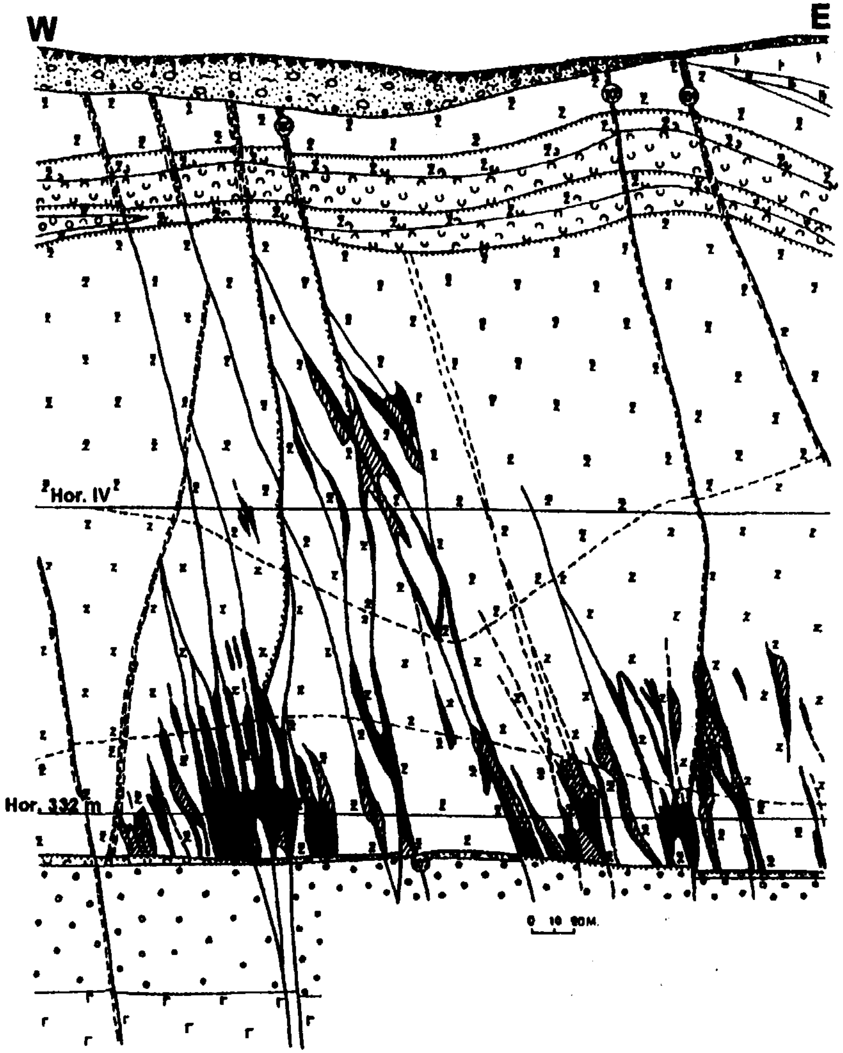

Fig.4. The Glubinny area of the Streltsovskoye deposit. Geological section on the 97-th prospecting line. Legend see on Fig.1.

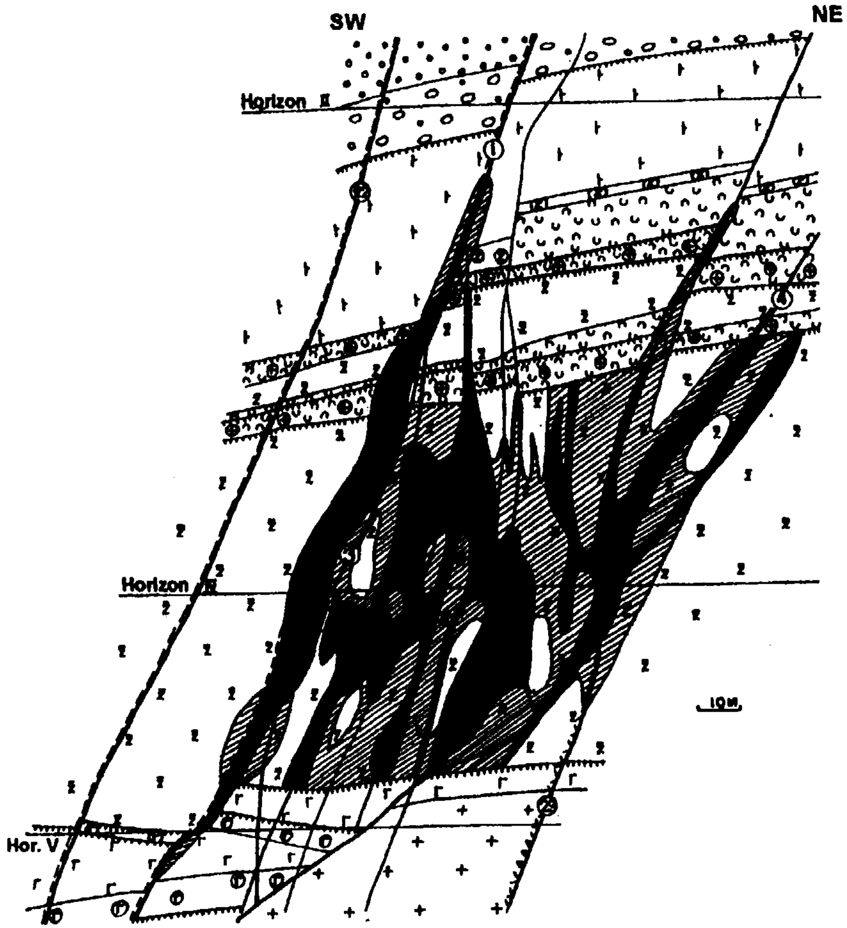

Fig. 5. The Streltsovskoye deposit. Geological section on the 113+50 prospecting line. Legend see on Fig. 1.

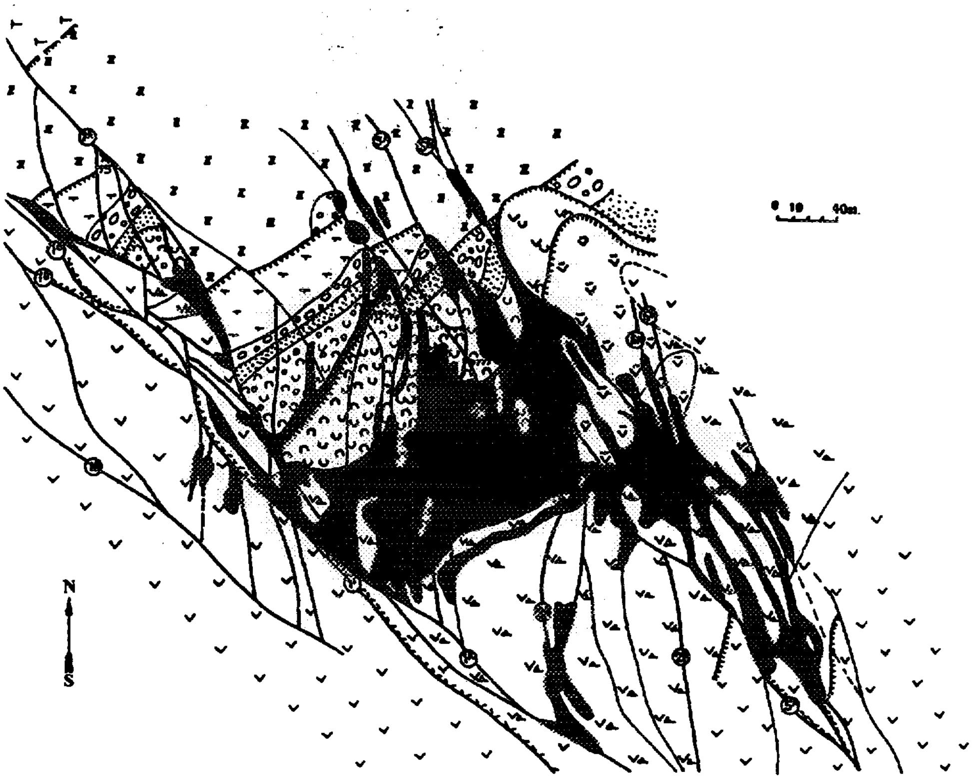

Fig. 6. The Tulukuyevskoye deposit. Geologocal plan of the horizon of 600 m. Legend see on Fig. 1.

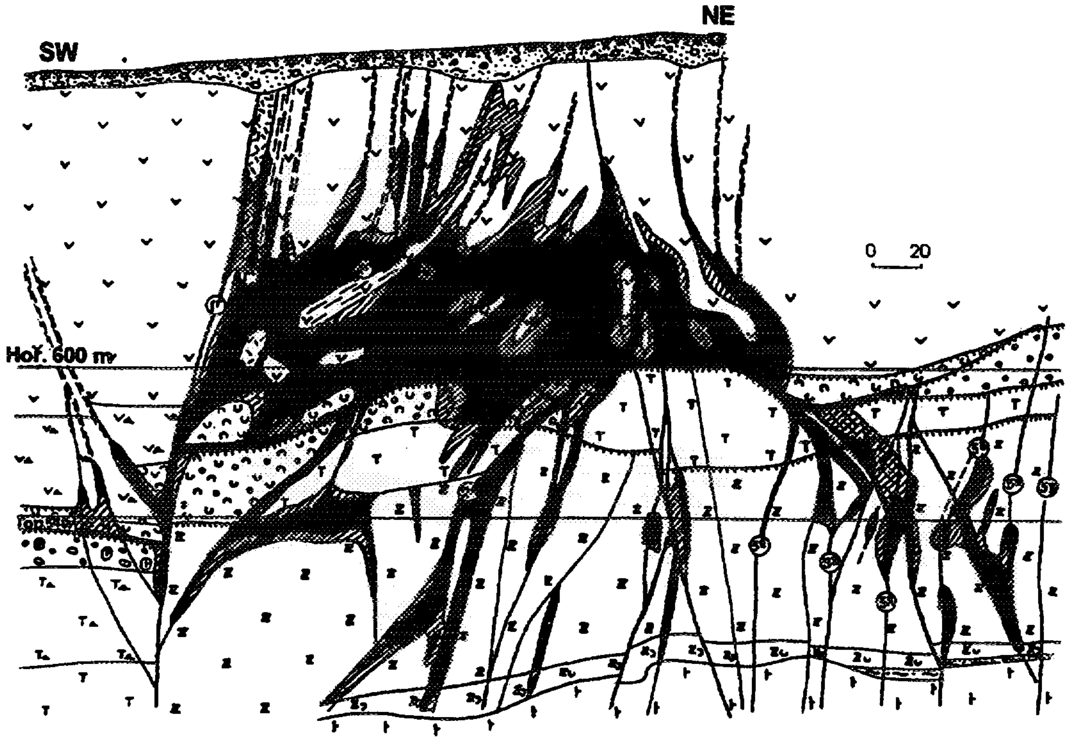

Fig. 7. The Tulukuyevskoye deposit. Geological section on the 35-th prospecting line. Legend see on Fig. 1.

are 30–40% over a thickness of 5 m. The thickness of ore bodies varies from a few tens to 50–60 m. The second ore-bearing zone represents the central part of the deposit. It is controlled by fractures of the meridional and northeastern strike, restricted by faults with a northwestern strike. Uranium mineralization forms large concentrations at the junction of different striking faults. The average uranium content is about 0.3%. A gently dipping bedded ore body also occurs in a lit-by-lit Tint located within a tuff-sandstone horizon under a felsite sheet. The average uranium content is 0.2%, and reaches 5–10% in intersections of steeply dipping fractures with the lit-by-lit zone.

Molybdenum is present in commercial contents at the Tulukuyevskoye deposit. It is mainly concentrates in the lower part of rich uranium ore bodies. The highest grade concentrations, occur in basalts and felsite tuffs. Concentrations of Molybdenum in different ore bodies vary in the range from a few hundreds of a percent to 10–12%. The average molybdenum content is 0.2%. The average rhenium content is 146 ppm based its presence in molybdenum concentrate.

Hydrothermal wall rock alteration is well developed, It is represented by silicification, hematitization, hydromicatization, carbonatization and albitization. Streaky silicification and chloritization are confined to large tectonic fractures. Uranium mineralization is represented by pitchblende forming metasomatic and streaky segregations. Coffinite occurs in very minor quantities in association with pitchblende. Uraninite and uranium titanite (brannerite) are always rare. Molybdenite occurs in ores as finely flaked and cryptocrystalline (jordisite) varieties that form metasomatic and streaky separations. Pyrite and lollingite are of limited.

The unique Antei deposit is situated directly under the Streltsovskoye deposit. It occurs a depth of 350–1400 m below the surface in the basement granites (Fig. 8). At the Antei deposit, the commercial reserves have an average uranium content of 0.2%. Of this, 78% of the ore has an average bofuranium content of 1.33%.

The major ore body is located in a large tectonic joint of the north-eastern (30°) trend in the Late Paleozoic metasomatic and intrusive-anatectic granites. The strike length of the body is 1000 m, and the dip extension is about 900 m. Its upper border is represented by a gently dipping fracture on the contact of structural eluvium of granites and the overlying dacites which enclose ore bodies of the Streltsovskoye deposit. The body has a complex structure. Ore stockwork-like swells the thickness, of which reaches up to 50 m, alternate with vein-like intervals with a thickness of a few metres. Most of the uranium reserves are concentrated in the central part of the body, the ore body is chimney shaped in section and stockwork-like in plan (Fig. 9). The height of this body is 200 m, the length is 300 m, the thickness is from 10 to 50 m. The uranium content exceeds 0.7–0.9%, reaching more than 4% in ore intersections. The average content is 0.954% in the central part. Molybdenum occurs in insignificant amounts of less than 0.03%.

These granites enclosing ore are characterized by intensive pre-ore pneumatolitic-hydrothermal alterations such as microclinization and early albitization. Zones of sericitization and silicification with polymetallic mineralization (galenite, sphalerite and molybdenite) were formed along tectonic faults developed mainly at deep levels during early stages of ore-accompanying alterations. Native silver is observed in galenite from these zones.

Low-temperature hydrothermal pre-ore processes caused formation of wide haloes of hydromica, veinlets of quartz, siderite, and pyrite along faults. Mixed-layered hydromica-montmorillonite and chlorite occur in central part of the haloes. At the beginning of the early ore stage, streaky-metasomatic albitization-2 was widely manifested and accompanied by brannerite segregation and ankerite veinlets in the lower parts of ore bodies. During the final uranium-ore depositionstage, numerous veinlets of quartz and chlorite (chamosite-type) were formed. Uranium mineralization is represented by pitchblende, less of ten coffinite and, insignificant quantities of branderite. The latter was developed only at the bottom of ore bodies at a depth of more than 800 m below the surface. Only pitchblende occur spread above this level. Molybdenum mineralization is represented by dispersed segregations of molybdenite, in association with cryptocrystalline quartz and

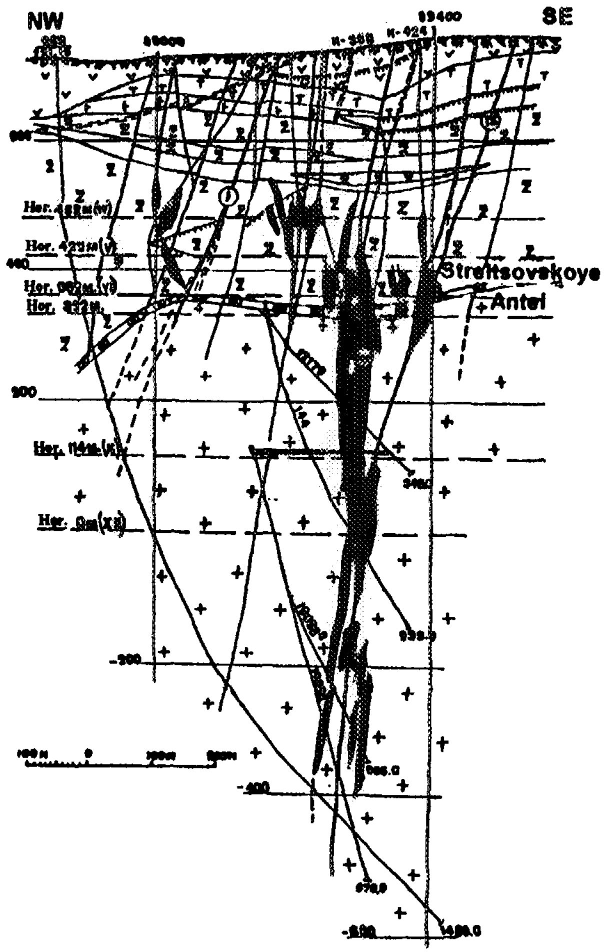

Fig. 8. The Antei deposit. Geological section on the 633-th prospecting line. Legend see on Fig. 1.

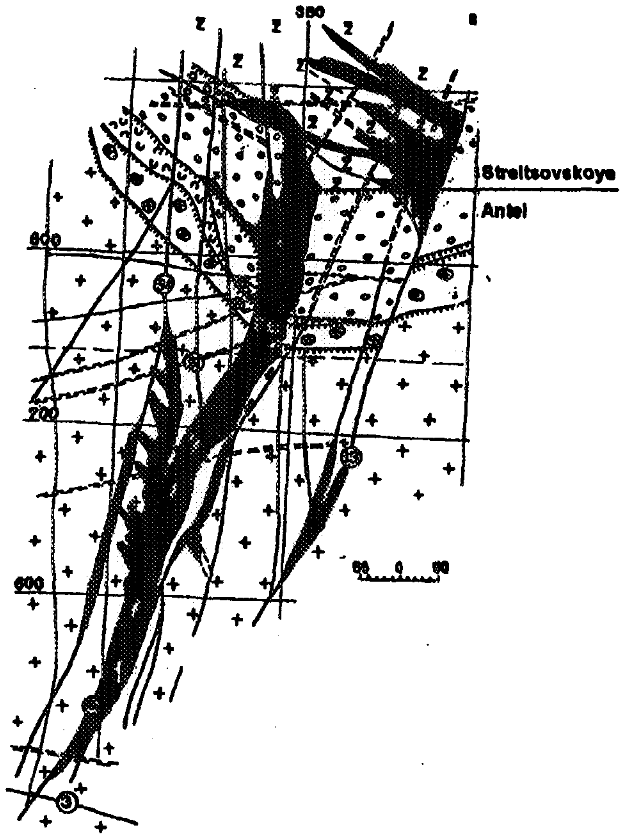

Fig. 9. The Antei and Strelsovskoye deposits. Geological plan of the horizon of 302 m. Legend see on Fig. 1.

fine flaked molybdenite, together in vuggy-disseminated segregations with pitchblende and lath-like quartz. Post-ore wall rock alterations are slightly developed in granites slightly. Veinlets of dickite, druzy quartz, calcite, pyrite and fluorite, cross cutting uranium mineral ratio, were formed in faults.

The large-scale Argunskoye deposit is located in the basement rocks. It is situated in the western part of the Streltsovskaya caldera at the intersection of the Argunskaya and the meridional deep shear zones. The deposit was formed on the northern side of the Krasnokamensky volcanic neck. The Argunskoye deposit is the only in the Streltsovskoye district where most of uranium ore body is concentrated in cabonaceous rocks.

The deposit was discovered 16 years after the start of exploration and the discovery of the Krashny Kamen deposit in the territory. The upper parts of ore bodies occur at a depth of 140 m below the surface under a basalt sheet, making them difficult to discover.

The deposit is located on the northern limb of an anticline of metamorphic rocks. The core and the southern limb of the anticline are composed of polychronic metasomatic granites. Metamorphic rocks are represented by steeply dipping strata of dolomitized limestones, thin intercalations of high-alumina quartz-mica-andalusite schists, and biotite-amphibole gneisses intruded by ortho-amphibolites. The limestones are about 200 m thick (Fig. 10).

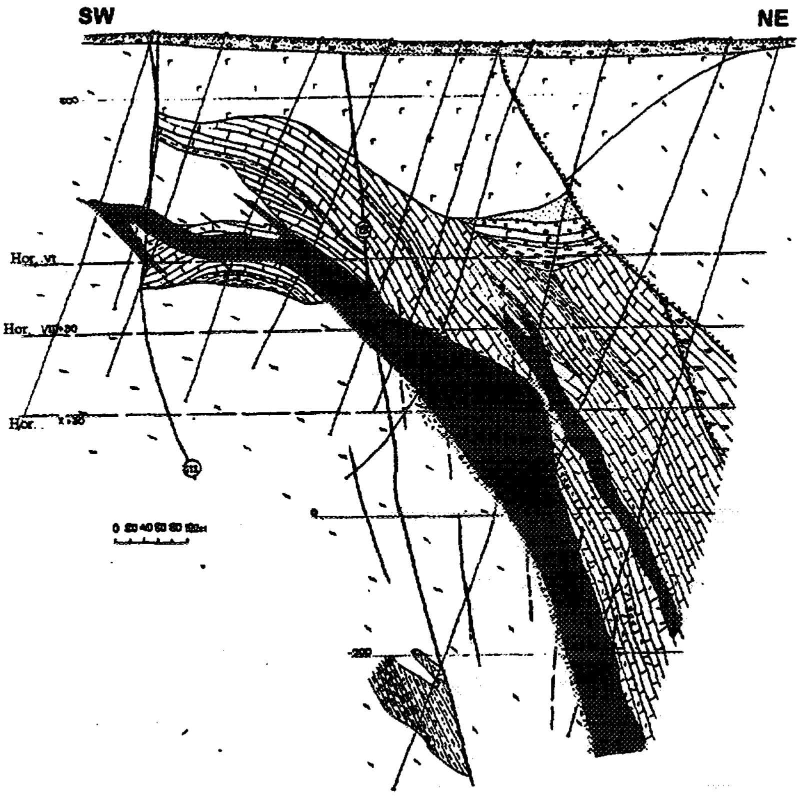

Fig. 10. The Argunskoye deposit. Geological section on the 2-nd prospecting line. Legend see on Fig. 1.

The granites and limestones are overlain by thick sheets of basalts and trachydacites. Ore-controlling structures are joints of the meridional, northwestern, sublatitudinal and rarely northeastern strike. The major host for uranium mineralization is a thick zone of breccias formed on the bottom of the limestone horizon of less importance are granites which occur under the limestones in the knot of intersections of differently directed steeply dipping faults. The limestone is brecciated over a thickness of 50–100 m; the breccia body has an isometric shape in plan and steep dip conformable with bedding dip. The main ore bodies of the Argunskoye deposit are concentrated in the zone of these breccias. Its width is 200–300 m, the vertical extent of the mineralization is more than 1000 m. The upper limit of the ore bodies is a fracture along the contact between the basement and cover rocks. This causes a screening effect for percolating hydrothermal solutions. Elongated on vertical line ore bodies, as well as vein-like bodies, which often are tongues of stockworks, occur in this ore-bearing zone. Uranium mineralization is irregular, contents vary from the cut-off to 3.5%. The thickness of ore intersections is in the range of 16 to 70 m. The major part of ore reserves is concentrated in ore shoots characterized by increased thickness of mineralization and high uranium contents. This results in about one third of the reserves being concentrated in blocks with rich ores (more than 0.3%).

Pre-ore high-temperature metasomatic rocks, such as microclinites, albitities, skarns, phlogopite metasomatites and greisens, are widespread within and near ore bodies. Low-temperature wall rock alterations is represented by argillization and silicification. Haloes of argillization have zoned structure. Kaolinite is developed in the upper parts. It is replaced by montmorillonite and chlorite depth and, deeper than 700 m, by hydromica. Chlorite and chlorite-montmorillonite metasomatites, related to the post-uranium fluorite process, are observed along faults that have been tested by deep drilling to a depth of 2500 m. Pitchblende and, less, coffinite occur in ores. The molybdenum content in carbonaceous ores is about to 0.15%, and in alumosilicate ores up to 0.26%. Molybdenum mineralization, represented by coarse flaked molybdenite and jordisite, in association with fluorite and sulfidized quartz, fills crack cavities, saturates breccia cement and wall rocks, forms veinlets. The fluorite content varies in the range from a few percent to 51%; the average content is 12%.

This brief description of the unique aspects at the reserves and ore grade of the molybdenum-uranium deposits of the Streltsovskoye district it shows that an important peculiarity controlling the formation of large-scale deposit mineralization is the coincidence of a single geostructural block ore-process, responsible for the generation of ore solutions, channels control transportation to the area of ore deposition, and favourable conditions for location of ore bodies. Specific conditions of the ore-preparing processes are defined by peculiarities of the endogenous development of the concrete block of earth crust.

The processes of polychronic granitization (PR_2–PZ_2) and dome formation in the post-granitization epoch includes silica-alkaline metasomatism and the formation of local metasomatic zones of quartz-K-feldspar-albitite and greisens along faults.

The most significant pneumatolitic-hydrothermal alterations took place in the Late Mesozoic period of activation. It is marked with tectonic rebuilding of the region and more intensive manifestation of silica-alkaline metasomatism and acidic leaching processes along reactivated shear zones. Here formed haloes of silica-potassic-sodic metasomatites and greisens in the basement rocks.

Evidence for the recurrent link in time between the ore deposits and the deep-seated, slowly evolving magmatic chamber include: the indications of multi-stage ore related processes in the basement of the Streltsovskaya caldera, occurring together with products of magmatism and low-temperature hydrothermal processes of ore formation within the deep-seated zone. The slowly evolving magma chamber was capable of generating fluid flows which introduced huge masses of ore forming, as well as other elements, in the area of deposition. The products of magmatism and subsequent pneumatolitic-hydrothermal and hydrothermal processes give evidence of directed migration and concentration of elements forming ore mineralization within deep-seated transcrustal faults.

The continental volcanic belt, where the Streltsovskoye ore field is located, has been traced for more than 1000 km across Russia, China and Mongolia.

The Dornotskoye uranium ore field of Mongolia was discovered and explored by Russian specialists as the continuation of this belt, by using criteria which were established as a result of the Streltsovskoye deposit investigation. Positive signs of uranium potential of volcanotectonic structures on the territory of northeastern China, similar to the Streltsovskaya and Dornotskaye calderas on the geological structure, were revealed within this belt by joint work of Russian and Chinese specialists.

A uranium-bearing in southeastern China is known in volcanotectonic caldera with commercial ores and other occurrences of uranium mineralization. From our point of view, this area has not been yet completely evaluated.

It is proposed that Meso-Cenozoic intracontinental volcanic belts in other regions of the earth which underwent long evolution are also potentially uranium-bearing. It is necessary to use all the available data on the formation conditions of deep deposits in volcanotectonic structures for discovering large uranium deposits within their limits.